REMARKS

Reconsideration of this application is respectfully requested.

Applicant's sincerely apologizes for not previously pointing out which claims of the newly submitted claims are readable on the elected species. The Examiner is correct in assuming that claims 58 and 59 read on the elected species. In addition, new claims 60 through 65 read on the elected species. Thus, claims 31 through 36, 39 through 44, and 58 – 65 are readable on the elected species.

The claims in the application were rejected as being unpatentable over Roberts '925 in view of Rauter, et al. '474 or as being unpatentable over Roberts, in view of Rauter and Ohmura, et al. '494. It is believed that the patents to Roberts is not of record in this application. As a result of an inventor/word search, it is believed that the patent to Roberts is U.S. Patent No. 4,694,925. The patent to Roberts is included an Information Disclosure Statement submitted herewith setting forth the patent to Roberts and the patents which were mentioned in the amendment dated June 20, 2005.

The claims in the application were rejected as being unpatentable over a combination of the patents to Roberts '925 and the patent Rauter, et al. '427. In absence of applicant's own disclosure, it would not be obvious to combine the disclosures in these two patents. The patent to Roberts discloses an electric motor which drives a ball nut and screw arrangement to turn the front wheels of a vehicle. The patent to Rauter discloses a hydraulic motor having a piston which is moved to rotate a sector gear, that is the toothed segment 23, to turn steerable rear wheels of a vehicle.

It would not would have been obvious to Rauter, et al. that the electric motor 50 of Roberts could be substituted for the hydraulic motor used by Rauter, et al. This is because the hydraulic motor of Rauter, et al. can provide substantially greater force to actuate a steering mechanism than the electric motor of Roberts. In addition, Rauter, et al. contemplates that a drive shaft 12 will extend through the working piston 18 of the hydraulic motor. It would be impossible to have a drive shaft for a differential gear system extend through the electric motor of Roberts. The only suggestion for combining these two diverse references must have been from applicant's own disclosure.

Independent claim 31 is directed to a steering system for a vehicle having first and second steerable wheels. The steering system includes an axle having end portions which are suspended by springs and which support steerable wheels of a vehicle. A steering member is supported in a chamber in the axle for movement along a linear path relative to the axle. The steering member has a screw thread portion disposed between first and second ends of the steering member.

A ball nut is associated with the screw thread portion of the steering member of claim 31 and is disposed in the chamber in the axle. An electric motor is connected with the axle. At least one drive member is connected with the electric motor and ball nut to rotate the ball nut to move the steering member in the chamber in the axle upon actuation of the electric motor.

In addition, claim 31 sets forth a takeoff assembly as being connected to a first end of the steering member. The takeoff assembly is movable with the first

end of the steering member along a linear path. The takeoff assembly has a portion projecting from an opening in the intermediate portion of the axle.

A first steering linkage is connected with the projecting portion of the takeoff assembly and extends along an outer side of the axle to transmit movement from the takeoff assembly to the first steerable wheel upon movement of the steering member and the takeoff assembly along the linear path. The first steering linkage is pivotally connected to the first steerable wheel to effect pivotal movement of the first steerable wheel about the first pivot axis upon movement of the steering member and the takeoff assembly along the longitudinal central axis of the steering member.

A second steering linkage is connected with the projecting portion of the takeoff assembly and extends along the outer side of the axle to transmit movement of the takeoff assembly to the second steerable wheel upon movement of the steering member and the takeoff assembly along the linear path. The second steering linkage is pivotally connected to the second steerable wheel to effect movement of the second steerable wheel about the second pivot axis upon movement of the steering member and the takeoff assembly along the linear path.

Claim 31 defines over the prior art, and particularly the patents to Roberts (4,694,925), Rauter, et al. (5,129,474), and/or Ohmura, et al. (5,007,494) by setting forth the takeoff assembly as being movable along the linear path with the steering member. The patents to Roberts and Ohmura, et al. do not disclose a takeoff assembly having a portion projecting from an opening in an intermediate portion of an axle in the manner set forth in claim 31. The patent to Rauter, et al.

discloses a hydraulic motor disposed within an axle and having a piston with rack gear teeth which are disposed in meshing engagement with gear teeth on a rotatable steering shaft 22. If the piston 18 of Rauter, et al. is considered to be a steering member and the rotatable steering shaft 22 is considered to be a takeoff assembly, it is believed to be clear that the takeoff assembly:

1. is not connected to a first end of the steering member, that is, the piston 18 of Rauter, et al., and

2. is not movable with the piston along a linear path.

The steering shaft 22 of Rauter, et al. rotates and does not move along a linear path.

Claims 32 through 44 depend from claim 31 and define over the prior art for substantially the same reasons as does claim 31 and by virtue of the structure and function set forth in these claims taken in combination with the structure and function of claim 31. Specifically, claim 32 sets forth a spring assembly as being disposed in the chamber in the axle. The spring assembly biases the steering member toward a straight ahead position. The patent to Ohmura, et al. discloses a spring 98 which is disposed in a housing 40. The housing 40 of Ohmura, et al. is not an axle. The housing 40 of Ohmura, et la. does not support steerable wheels of a vehicle. There is no disclosure in any of the references of having a spring assembly disposed in a chamber in an axle to bias a steering member toward a straight ahead position in the manner set forth in claim 32.

Claim 33 depends from claim 31 and sets forth a spring assembly as disposed in a chamber in the axle. The spring assembly comprises a single

spring acting to bias the steering member toward a straight ahead position when the steering member is moved from the straight ahead position. The only reference disclosing an axle having a chamber in association with a steering device is the patent to Rauter, et al. However, the patent to Rauter, et al. does not contemplate that a spring assembly will be disposed in the chamber in the axle to bias a steering member toward a straight ahead position in the manner set forth in claim 33. The patent to Ohmura, et al. discloses a spring 98. However, the spring of Ohmura, et al. is not disposed in a chamber in an axle which supports steerable wheels of a vehicle.

Claim 34 depends from claim 33 and sets forth fixed stops as being disposed in the chamber in the axle and capture the spring between the fixed stops when the steering member is in a straight ahead position. The steering member has movable stops that are movable relative to the fixed stops to compress the spring upon movement of the steering member from the straight ahead position. The patent to Ohmura, et al. discloses a pair of stoppers 100 and 102 (Fig. 2). However, the stoppers 100 and 102 of Ohmura, et al. are not disposed in a chamber in an axle which supports first and second steerable wheels of a vehicle. The housing 40 of Ohmura, et al. is not an axle. The housing 40 of Ohmura, et al. does not support steerable wheels of a vehicle.

Claim 35 depends from claim 31 and sets forth a spring assembly as being disposed in a chamber in the axle. The takeoff assembly includes a piston located between the ball nut and the spring assembly. The spring assembly is effected to urge the takeoff assembly toward a straight ahead position. The

patent to Ohmura, et al. discloses a ball nut 82. The patent to Ohmura, et al. also discloses a spring 98. However, the ball nut and spring of Ohmura, et al. are not disposed in a chamber in an axle which supports vehicle wheel in the manner set forth in claim 31 from which claim 35 depends. Furthermore, the patent to Ohmura, et al. does not disclose a piston which is located between the ball nut and the spring assembly.

Claim 36 depends from claim 35 and sets forth a stop means as being spaced apart from the piston and acting between a spring and a spring assembly and the steering member for transmitting biasing force of the spring to the steering member.

Claim 39 depends from claim 31 and sets forth a motor control system which is operative to enable the generation of the back EMF in the motor upon movement of the steering member toward the straight ahead position in order to resist movement of the steering member toward the straight ahead position. The patent to Ohmura, et al. discloses a motor 32 having a brake 46 and a double clutch mechanism 48. The motor 32 of Ohmura, et al. does not have a motor control system which is operative to enable the generation of back EMF in a motor in the manner set forth in claim 39.

Claim 40 depends from claim 31 and sets forth the electric motor as being located outside the chamber in the axle. The drive member extends through an opening formed in the axle. The patent to Ohmura, et al. discloses a reduction gear train 50 which extends through an opening in a housing 40. However, the housing 40 of Ohmura, et al. is not an axle which supports vehicle wheels.

Claim 41 depends from claim 31 and sets forth the steering member as being free of rack teeth. Obviously, the piston 18 of Rauter, et al. is not free of teeth.

Claim 42 depends from claim 31 and sets forth the electric motor as being effective to resist movement of the steering member toward a straight ahead position.

Claim 43 depends from claim 42 and sets forth a locking member for locking a steering member in a straight ahead position. The patents to Roberts, Rauter, et al. and/or Ohmura, et al. do not disclose a locking member for locking a steering member in a straight ahead position.

Claim 44 depends from claim 31 and sets forth a drive member as being a belt which extends partway around the ball nut and partway around an output member connected with the electric motor.

Independent claim 60 is directed to a steering system for a vehicle having steerable wheels. The system includes an axle having end portions which are suspended by springs and which support first and second steerable wheels of a vehicle. A steering member is supported in a chamber in the axle. The steering member is movable between a straight ahead position and positions offset from the straight ahead position of the steering member.

A spring assembly is set forth as being disposed in the chamber in the axle and as being connected with the steering member. The spring assembly is effective to provide force which urges the steering member toward the straight ahead position when the steering member is in a position offset from the straight

ahead position. A ball nut is associated with a screw thread portion of the steering member and is disposed in a chamber the axle. A drive member is connected with the electric motor and the ball nut to rotate the ball nut to move the steering member away from the straight ahead position against the influence of force provided by the spring assembly upon actuation of the electric motor.

In addition, claim 60 sets forth a motor control system as being connected with the electric motor and operative to enable generation of back EMF in the electric motor upon movement of the steering member toward the straight ahead position under the influence of the spring assembly. The back EMF generated in the electric motor is effective to oppose movement of the steering member toward the straight ahead position under the influence of force applied by the spring assembly.

A takeoff assembly is connected to the steering member. The takeoff assembly has a portion projecting from an opening in the intermediate portion of the axle. A first steering linkage is connected with the projecting portion of the takeoff assembly and extends along the outer side of the axle to transmit movement of the takeoff assembly to the first steerable wheel. A second steering linkage is connected with the projecting portion of the takeoff assembly and extends along the outer side of the axle to transmit movement of the takeoff assembly to the second steerable wheel.

Claim 60 defines over the prior art and particularly the patents to Roberts, Rauter, et al., and/or Ohmura, et al. by setting forth the motor control system which enables generation of back EMF in the electric motor upon movement of

the steering member toward the straight ahead position under the influence of the spring assembly. The back EMF is effective to oppose movement of the steering member toward the straight ahead position under the influence of force provided by the spring assembly. The back EMF reduces the rate which the spring assembly is effective to move the steering member back to the straight ahead position.

Claims 61 through 66 depend from claim 60 and define over the prior art for substantially the same reasons as does claim 60 and by virtue of the structure and function set forth in these claims taken in combination with the structure and function of claim 60. Specifically claim 61 sets forth the first and second ends of the steering member as being disposed in the chamber in the axle. The patents to Roberts and /or Ohmura, et al. do not even remotely contemplate having first and second ends of a steering member disposed within a chamber in an axle.

Claim 62 depends from claim 60 and sets forth the electric motor as being located outside of the chamber in the axle. The drive member extends through an opening formed in the axle.

Claim 63 depends from claim 60 and sets forth the steering member as being free from rack teeth.

Claim 64 depends from claim 60 and sets forth the takeoff assembly as being connected to a first end of the steering member for movement therewith along a linear path. It is believed to be clear that in the patent to Rauter, et al., the takeoff assembly is <u>not</u> movable along a linear path.

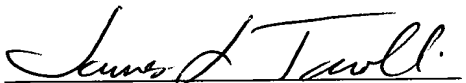
Claim 65 depends from claim 60 and sets forth the spring assembly as including only a single spring which acts to bias the steering member toward a straight ahead position.

Claim 66 depends from claim 60 and sets forth the spring assembly as including a first spring member between the takeoff assembly and the axle and a second spring member acting between the takeoff assembly and the axle.

In view of the foregoing remarks, it is believed to be clear that the claims in this application patentably define over the prior art. Therefore, it is respectfully requested that the claims be allowed and this application passed to issue.

If for any reason the Examiner believes that a telephone conference would expedite the prosecution of this application, it is respectfully requested that the Examiner call applicant's attorneys in Cleveland, Ohio at 621-2234, area code 216. Please charge any deficiency in the fees for this application to our Deposit Account No. 20-0090.

Respectfully submitted,



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